RESEARCH, DEVELOPMENT & TECHNOLOGY TRANSFER
QUARTERLY PROGRESS REPORT

Wisconsin Department of Transportation
DT1241 8/2010

INSTRUCTIONS:
Research project investigators and/or project managers should complete a quarterly progress report (QPR) for each calendar quarter during which the projects are active.

WisDOT research program category: ☐ Policy research ☒ Wisconsin Highway Research Program ☐ Other ☐ Pooled fund TPF#	Report period year: 2010 ☐ Quarter 1 (Jan 1 – Mar 31) ☐ Quarter 2 (Apr 1 – Jun 30) ☐ Quarter 3 (Jul 1 – Sep 30) ☒ Quarter 4 (Oct 1 – Dec 31)

Project title: Laboratory Study of Concrete Properties to Support Implementation of the New AASHTO Mechanistic-Empirical Pavement Design Guide		
Project investigator: Steve Cramer	Phone: 608-265-2001	E-mail: cramer@engr.wisc.edu
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WisDOT contact: Barry Paye/James Parry	Phone:	E-mail:
WisDOT project ID: 0092-11-05	Other project ID:	Project start date: 10/21/2010
Original end date: 10/20/2011	Current end date: 10/20/2011	Number of extensions: 0

Project schedule status:
☐ On schedule ☐ On revised schedule ☐ Ahead of schedule ☒ Behind schedule

Project budget status:

Total Project Budget	Expenditures Current Quarter	Total Expenditures	% Funds Expended	% Work Completed
$102,000	$4494	$4494	4%	13%

Project description:
The strength and durability of concrete paving materials are largely dependent on the curing conditions under which the structure is maintained at an early age. Large scale concrete paving operations present unique challenges that prevent the implementation of curing strategies other than the application of membrane forming curing compounds (MFCCs). The method of action of curing compounds is unknown other than that they prevent evaporation via the formation of a hydrophobic membrane. Curing compounds have a variety of formulations and chemistries that affect the nature of this membrane, its effectiveness at preventing evaporation, and interaction with the curing concrete surface. This situation is further complicated when supplemental cementitious materials (SCMs including slag, fly ash, etc.) are included in the concrete design.
The objectives of this research are to:

1. Evaluate the scaling resistance of concrete materials prepared with several different MFCCs and SCMs.
2. Evaluate the chloride ion penetration resistance of the above materials
3. Evaluate the effectiveness of several MFCCs at preventing evaporation of water from concrete surfaces.
4. Attempt to determine the microstructural consequences of curing concrete pavements with MFCCs.

Progress this quarter (includes meetings, work plan status, contract status, significant progress, etc.):

In this quarter the team focused on: performing a literature review, experimental design, experimental materials selection and analysis, and experimental logistics. The research team meets every other week to review progress and deal with logistics.

1. A review of the literature relevant to the study is ongoing and will be followed by preparation of a literature review summary document.
2. Meetings between the Primary Investigator and representatives from WisDOT and the WCPA lead to the inclusion of ASTM C156 testing if possible (originally optional in the research proposal) and have addressed ambiguities in the proposal. A protocol for sample preparation activity is being developed. ASTM C156 provides a measure of water retention of membrane forming curing compounds. The test while relevant was not part of the project rfp. It requires a particular evaporation rate and there are some concerns about precision and repeatability. Given the compressed timescale of this project we will conduct this test if it can be conducted readily within the project cost and timeframe.
3. Two types of coarse aggregate, a fine aggregate, ordinary Portland cement, Grade 100 slag, and Class C fly ash have been received and analyzed in preparation of sample production. A supplier was found for coating compounds to be tested, but not yet received.

Anticipated work next quarter:

Work next quarter will be focused on sample preparation and beginning the long term ponding for ASTM C672 and C1543 testing.

1. Completion of the literature review and literature review summary.
2. Concrete mixing and sample preparation.
3. ASTM C39, AASHTO T119, T152, T121 testing of concrete specimens
4. Concrete specimens subjected to freeze/thaw cycling and chloride ponding for ASTM C672 and C1543 testing

Circumstances affecting project or budget:

The project is slightly behind schedule as the 12 month time frame for a laboratory project of this type is very tight and difficult to achieve.

Insert Gantt chart and other project documentation – attach additional pages if necessary

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Staff receiving QPR:	Date received:
Staff approving QPR:	Date approved: